

173. The method of Claim 171 or 172 wherein the nanoparticles are metallic nanoparticles, semiconductor nanoparticles, or a combination thereof.

174. The method of Claim 173 wherein the metallic nanoparticles are made of gold, and the semiconductor nanoparticles are made of CdSe/ZnS (core/shell).

175. A method of nanofabrication comprising:
providing at least two types of nanoparticles having oligonucleotides attached thereto,

the oligonucleotides on the first type of nanoparticles having a sequence complementary to that of the oligonucleotides on the second of the nanoparticles;

the oligonucleotides on the second type of nanoparticles having a sequence complementary to that of the oligonucleotides on the first type of nanoparticles; and

contacting the first and second types of nanoparticles under conditions effective to allow hybridization of the oligonucleotides on the nanoparticles to each other so that a desired nanomaterial or nanostructure is formed.

176. The method of Claim 175 wherein the nanoparticles are metallic nanoparticles, semiconductor nanoparticles, or a combination thereof.

177. The method of Claim 176 wherein the metallic nanoparticles are made of gold, and the semiconductor nanoparticles are made of CdSe/ZnS (core/shell).

178. Nanomaterials or nanostructures composed of nanoparticles having oligonucleotides attached thereto, the nanoparticles being held together by oligonucleotide connectors.

179. The nanomaterials or nanostructures of Claim 178 wherein at least some of the oligonucleotide connectors are triple-stranded.

180. The nanomaterials or nanostructures of Claim 178 wherein the nanoparticles are metallic nanoparticles, semiconductor nanoparticles, or a combination thereof.

181. The nanomaterials or nanostructures of Claim 180 wherein the metallic nanoparticles are made of gold, and the semiconductor nanoparticles are made of CdSe/ZnS (core/shell).

182. A composition comprising at least two types of nanoparticles having oligonucleotides attached thereto, the oligonucleotides on the first type of nanoparticles having a sequence complementary to the sequence of a first portion of a nucleic acid or a linking oligonucleotide, the oligonucleotides on the second type of nanoparticles having a sequence complementary to the sequence of a second portion of the nucleic acid or linking oligonucleotide.

183. The composition of Claim 182 wherein the nanoparticles are metallic nanoparticles, semiconductor nanoparticles, or a combination thereof.

184. The composition of Claim 183 wherein the metallic nanoparticles are made of gold, and the semiconductor nanoparticles are made of CdSe/ZnS (core/shell).

185. An assembly of containers comprising:
 a first container holding nanoparticles having oligonucleotides attached thereto, and
 a second container holding nanoparticles having oligonucleotides attached thereto,

the oligonucleotides attached to the nanoparticles in the first container having a sequence complementary to that of the oligonucleotides attached to the nanoparticles in the second container,

the oligonucleotides attached to the nanoparticles in the second container having a sequence complementary to that of the oligonucleotides attached to the nanoparticles in the second container.

186. The assembly of Claim 185 wherein the nanoparticles are metallic nanoparticles, semiconductor nanoparticles, or a combination thereof.

187. The assembly of Claim 186 wherein the metallic nanoparticles are made of gold, and the semiconductor nanoparticles are made of CdSe/ZnS (core/shell).

188. A nanoparticle having a plurality of different oligonucleotides attached thereto.

189. A method of separating a selected nucleic acid having at least two portions from other nucleic acids, the method comprising:

providing two or more types of nanoparticles having oligonucleotides attached thereto, the oligonucleotides on each of the types of nanoparticles having a sequence complementary to the sequence of one of the portions of the selected nucleic acid; and

contacting the nucleic acids and nanoparticles under conditions effective to allow hybridization of the oligonucleotides on the nanoparticles with the selected nucleic acid so that the nanoparticles hybridized to the selected nucleic acid aggregate and precipitate.

190. A method of binding oligonucleotides to charged nanoparticles to produce stable nanoparticle-oligonucleotide conjugates, the method comprising: